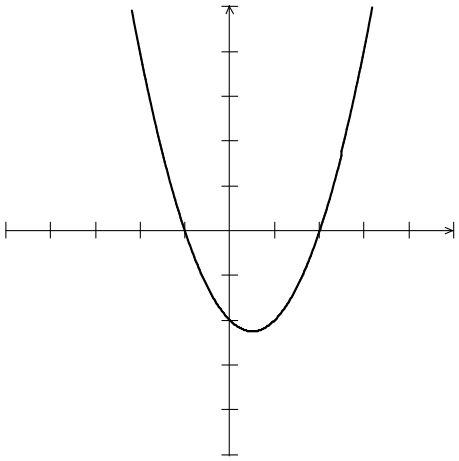
Finding Equations of Tangent Lines

To find the equation of a tangent line to a function at a specific point:

1. Find the *y*-value of the *point* on the graph by substituting in the given *x*-value into the original equation.
2. Find the derivative of *f*.
3. Evaluate $f'(x)$ to get the *slope* of the graph… THIS MUST BE A NUMBER!
4. Now you have the two basics for any equation of a line, a point and a slope. Use the point-slope formula to write the equation for the tangent line at the given *x*-value.

$$y_2 - y_1 = m\,(x_2 - x_1)$$

EX #1: The graph of $y = x^2 - x - 2$ is shown at right.



A.) Find the general derivative of the function.

B.) Find the point on the curve when x = 1.

C.) Find the slope of the tangent line at this point.

D.) Write the equation of the tangent line to the graph.

E.) Draw the tangent line on the sketch and label the point of tangency.

EX #2: Let $f(x) = 4x^3 - 5x + 3$. Find the equation of the line tangent to the graph of f at $x = -1$.

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EX #3: Given the differentiable functions, $f(x)$ and $g(x)$. Using the table below,

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
6	-3	7	2	-4

A.) Find the equation of the line tangent to $g(x)$ at $x = 6$.

B.) Find the equation of the line tangent to $f(x)$ at $x = 6$.

EX #4: Find the equation of the line tangent to the graph of $f(x) = x^4 + 2x^2$ at the point where $f'(x) = 2$. Round all values to three decimal places.

EX #5: Given $f(x) = k - x^2$, find the value of k, such that the line $y = -6x + 1$ is tangent to the graph of the function.

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